AEDC

Arnold Engineering Development Center
Arnold Air Force, Base, Tenn. 37389
An Air Force Materiel Command Test Facility

LARGE ROCKET TEST FACILITY J-6

The Large Rocket Test Facility (J-6) at the Air Force's Arnold Engineering Development Center fulfills a national need for a large solid-propellant rocket motor test facility to safely test detonable motors at simulated altitude conditions, and to obtain accurate measurements during testing.

Rocket motor testing at AEDC supports cost-effective development of current and future launch and space systems. The continuing demand for superior launch systems drives the development of advanced solid-propellant rocket motors. Their successful acquisition is closely linked to the availability and adequacy of rocket motor test facilities to solve development problems and determine motor operability, reliability and performance characteristics.

The J-6 site is located away from other AEDC facilities to prevent damage to, or destruction of, other unique test facilities at AEDC should a detonation occur.

J-6's horizontally configured test cell allows for more accurate measurement of characteristics during test firings, to accommodate development of advanced propulsion systems.

FUTURE ROCKET MOTOR TEST REQUIREMENTS

Improved solid-propellant rocket motor performance since the 1960s, when AEDC's other rocket test facilities were built, greatly increased the risk to adjacent AEDC test facilities. Improved motor performance has been achieved by using lighter cases, higher chamber pressures, extendible nozzle exit cones and higher energy chemical propellants. The new high-energy propellants can actually detonate with yields greater than TNT, instead of creating a mass fire.

As a result, AEDC facilities properly sited for propellants of the 1960s were improperly sited for the higher energy, highly detonable, propellants of the 90s and beyond.

The failure of these detonable motors could result in significant damage, not only to the test cell, but to other AEDC facilities with a totaled value of more than $6 billion. Of even greater national significance was the potential impact on the nation's aerospace program if a test failure damaged several unique AEDC facilities. J-6 permits AEDC testing of detonable motors without risk to other AEDC facilities.

J-6 tests large, detonable solid-propellant rocket motors with up to 500,000 pounds of thrust and propellant weights up to 80,000 pounds mass (equivalent to 100,000 pounds of TNT) at altitude conditions up to 100,000 feet.

The need for the large, remote facility was reinforced in Nov. 1985, when a Peacekeeper Stage III motor failed during a test with a fraction of its propellant left and destroyed the J-5 test cell. The loss left the nation with a single test facility, AEDC's J-4, to develop and

qualify the Peacekeeper, Small ICBM Trident II and others. J-5 was rebuilt in one year and became operational again in Dec. 1986.

J-6 DESIGN AND CONSTRUCTION

A three-year construction contract for $173 million was awarded in Nov. 1989 to a joint venture of EBASCO Constructors, Norcross, Ga., and Gust K. Newberg Construction, Chicago.

Before construction, a partnering agreement was entered into by all parties involved including: Army Corps of Engineers, Air Force, Architectural Engineer (designer), AEDC support contractors, construction contractor, and major subcontractors. All parties agreed to the positive utilization of partnering in the construction and contract administration of the project. They believed through partnering, they could provide a safe, quality, functional test facility completed on time and within their respective budgets. These goals were achieved through a commitment to teamwork and partnering characterized by mutual trust, responsiveness, flexibility and open communications.

Construction began in August 1990. J-6 was completed four months ahead of schedule and $10 million under budget. The safety record achieved during construction was unprecedented with only four lost-time accident minimum injuries with more than 2.7 million manhours worked.

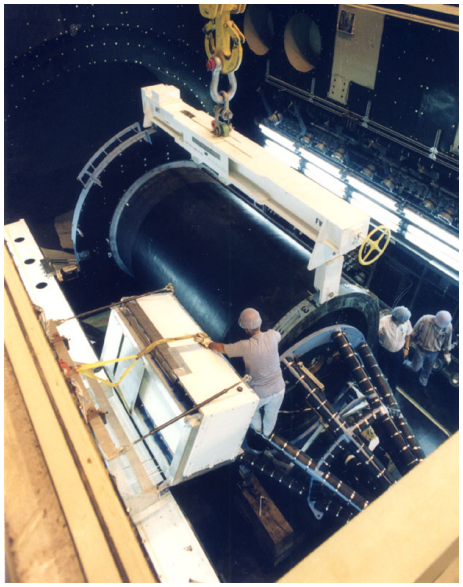
Arnold Engineering Development Center (AEDC) is the most advanced and largest complex of flight simulation test facilities in the world with 53 aerodynamic and propulsion wind tunnels, rocket and turbine engine test cells, space environmental chambers, arc heaters, ballistic ranges and other specialized units. Twenty-seven of the center's test units have capabilities unmatched elsewhere. Facilities can simulate flight conditions from sea level to altitudes above 100,000 feet, and from subsonic velocities to well over Mach 20.

The AEDC mission is to:

• Test and evaluate aircraft, missile and space systems and subsystems at the flight conditions they will experience during a mission to: help customers develop and qualify the systems for flight, improve system designs and establish performance before production; and to help **users** troubleshoot problems with operational systems

• Conduct a research and technology program to develop advanced testing techniques and instrumentation, and to support the design of new test facilities. The continual improvement helps satisfy testing needs and keeps pace with rapidly advancing aircraft, missile and space system requirements

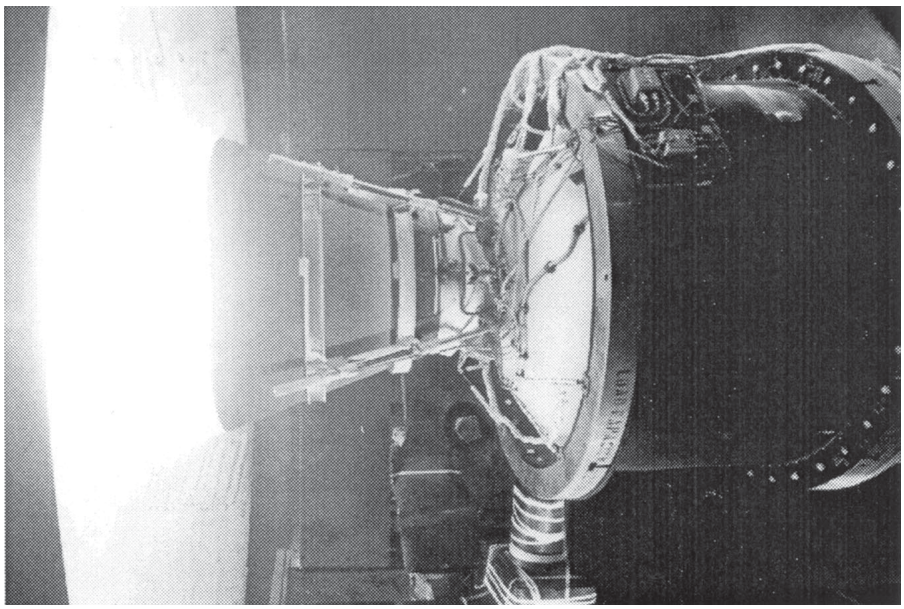
• Maintain and modernize the center's existing test facilities



A Peacekeeper stage II is prepared for the first validation motor firing of the J-6 facility in the fall of 1994.

AEDC, an Air Force Materiel Command Facility and an important national resource, has contributed to the development of practically every one of the nation's top priority aerospace programs including the Atlas, Titan, Minuteman and Peacekeeper ICBMs, projects Mercury, Gemini, Apollo, the space shuttle, F-14, F-15, F-16, F/A-18, F-22, F-111, F-117, A-10, C-5, C-17, C-141, X-15, X-29, X-33, B-58, B-1 and B-2 aircraft, Navstar Global Positioning System satellites, the Inertial Upper Stage, the antisatellite program, Polaris, Posidon and Trident submarine launched ballistic missiles, Tomahawk cruise missile, Air-Launched Cruise Missile and the Advanced Medium-Range Air-to-Air Missile.

Customers include the Department of Defense, Army, Navy and Air Force organizations; the National Aeronautics and Space Administration, domestic and foreign private industry, allied foreign governments and educational institutions.



A new exhausting method saved a customer $10,000 during the test of this 17,600-pound Peacekeeper Stage III A/S-2 motor. The Alliant Techsystems Inc., motor was test fired at an average simulated altitude of 103,000 feet in the J-6 Large Rocket Test Facility.

Office of Public Affairs, Arnold Engineering Development Center,
100 Kindel Drive, Suite B-213
Arnold Air Force Base, Tenn., 37389-2213 • (615) 454-5586 • DSN 340-5586
AEDC Internet Web Homepage Address www.arnold.af.mil
Current as of August 1996 Cleared for Public Release
95-ETF-0002